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to hold a winter meeting at such time and place as the Sectional Committee should decide.

FRANK RUSSELL,
Secretary.

HARVARD UNIVERSITY.

SCIENTIFIC BOOKS.

Etude sur la grêle. Défense des récoltes par le tir du canon. By V. VERMOREL. Librairie du Progrès Agricole et Viticole ; Villefranche. July, 1900.

In this pamphlet of 77 pages the well-known viticultural expert and director of the station at Villefranche gives an account of the latest (up to July 1st) phase of the subject of Wetter-schiessen—the protection of crops from hail by means of the vertical firing of specially constructed cannon at the threatening clouds. Chapter 1 gives a *résumé* of the various theories of hail-formation, affording striking proof of the uncertainty still existing in this regard, and especially as to the part played by atmospheric electricity in the most damaging hailstorms, viz., those of summer. There follows a brief discussion of the possible explanations of the action of the vertical projection of the annular whirl, which seems to be essential to the production of the effect, and e. g., tears a paper target placed 100 meters from the gun, and according to trigonometric measurements may reach a height of over two kilometers. The claim made, and sustained by an overwhelming number of observations, is that the commotion caused by these whirls in the hail-clouds, if produced in time, will cause rain to fall in place of hail.

Chapter 2 gives abstracts of the reports made to the congress of Italian hail-protection syndicates held at Casale Monferrato in November, 1899, which was attended by three delegates from France, the author among the number. The reports are from the provinces of Vicenza, Treviso, Verona, Padua, Udine, Pavia, Bergamo, Alexandria and Novara. From all of these regions the reports are very encouraging, in part enthusiastic. The Bergamo reporter sums up by saying that "those who have done the shooting are desirous of continuing it; those outside the defended area regret not having done it. The results obtained this (last)

season could not be more encouraging, and will enable us to complete the means of defense." This appears to be substantially the consensus of opinion of those attending the congress.

Chapter 3 gives the details of the construction and handling of the cannon, which does not differ materially from the original prescriptions of Stiger, except in making the gun breech-loading.

Chapter 4 gives details of the desirable organization of the shooting stations, as now established in the Beaujolais, Rhone Valley. Isolated guns are of little value unless placed on high points. Each gun can defend 25 hectares (62 acres); rapid and continuous firing is especially important at the first approach of the cloud. A code of signals is provided to insure concerted and prompt action. The government supplies powder for the purpose at reduced rates. The expense of establishing a station is placed at 11 francs (\$2.15) per hectare, or a little less than \$1 per acre; current annual expense, about 65 cents per acre, estimating that 500 shots may have to be fired.

Among the striking points noted is that from 2000 stations last year, *fifteen thousand* are in operation in Italy this year. Moreover, the insurance companies have reduced the premiums 33 per cent. for the areas provided with shooting stations.

Is it not about time that some experiments in the same line were set on foot in our thunder-storm-ridden Middle West? If, as some allege, this is merely a passing popular delusion, it is a remarkably persistent one, backed by very heavy pecuniary investments, and not definitely assailable on scientific grounds.

E. W. HILGARD.

A Brief Guide to the Commoner Butterflies of the Northern United States and Canada. By SAMUEL HUBBARD SCUDDER. New York, Henry Holt & Co. 1899. Pp. xi + 210, 22 plates of wood-cuts, 10 cuts in text.

This book is a reprint of the first edition of the work, published by the same house in 1893, and so far as the reviewer is able to ascertain, is not different in any respect from the first edition, save in the addition of the plates, which were taken for the most part from the